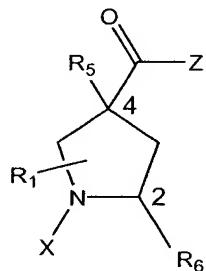


What is Claimed Is:

1. A compound having the formula



(1)

5

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

10 R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3 or 5;

R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2Y ;

R_6 represents a carboxylic acid or a strongly activated ester ; and

15 the stereochemical configuration at positions 2 and 4 and of the carbon bearing R_1 (if R_1 is not H) can be any one of (S,S,S), (S,S,R), (S,R,S), (S,R,R), (R,S,S), (R,S,R), (R,R,S) or (R,R,R).

2. The compound of Claim 1, wherein R_5 is N_3 .

3. The compound of Claim 1, wherein R_5 is NR_2Y .

20 4. The compound of Claim 1, wherein Z is OMe .

5. The compound of Claim 1, wherein X is benzylcarbamate.

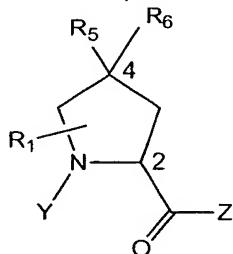
6. The compound of Claim 1, wherein Y is 2-nitrobenzenesulfonamide.

7. The compound of Claim 1, wherein Y is 9-fluoroenylmethylcarbamate.

8. The compound of Claim 1, wherein X is benzylcarbamate, R_5 is NR_2Y , R_2 is H, 25 Y is 9-fluoroenylmethylcarbamate, Z is $-OMe$, and R_6 is a carboxylic acid.

9. The compound of Claim 1, wherein R_1 is an alkene.

10. The compound of Claim 1, wherein R₁ is a protected carboxylate.
11. The compound of Claim 1, wherein R₁ is a protected alcohol.
12. The compound of Claim 1, wherein R₁ is a protected thiol.
13. A compound having the formula



where:

- X represents a first amine protecting group;
- 10 Y represents a second amine protecting group;
- Z represents a weak leaving group;
- R₁ represents an H, or a functional group, and can be attached to the molecule at positions 2, 3 or 5;
- R₂ represents an H or a functional group;
- 15 R₅ represents N₃ or NR₂X;
- R₆ represents a carboxylic acid or a strongly activated ester ; and
- the stereochemical configuration at positions 2 and 4 and of the carbon bearing R₁ (if R₁ is not H) can be any one of (S,S,S), (S,S,R), (S,R,S), (S,R,R), (R,S,S), (R,S,R), (R,R,S) or (R,R,R).
- 20 14. The compound of Claim 13, wherein R₅ is N₃.
15. The compound of Claim 13, wherein R₅ is NR₂X.
16. The compound of Claim 13, wherein Z is OMe.
17. The compound of Claim 13, wherein X is benzylcarbamate.
18. The compound of Claim 13, wherein Y is 2-nitrobenzenesulfonamide.
- 25 19. The compound of Claim 13, wherein Y is 9-fluoroenylmethylcarbamate.

20. The compound of Claim 13, wherein X is benzylcarbamate, R₅ is NR₂X, R₂ is H, Y is 9-fluoroenylmethylcarbamate, Z is -OMe, and R₆ is a carboxylic acid.

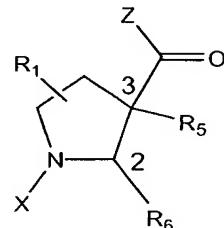
21. The compound of Claim 13, wherein R₁ is an alkene.

5 22. The compound of Claim 13, wherein R₁ is a protected carboxylate.

23. The compound of Claim 13, wherein R₁ is a protected alcohol.

24. The compound of Claim 13, wherein R₁ is a protected thiol.

25. A compound having the formula



where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

15 Z represents a weak leaving group;

R₁ represents an H, or a functional group, and can be attached to the molecule at positions 2, 4 or 5;

R₂ represents an H or a functional group;

R₅ represents N₃ or NR₂Y;

20 R₆ represents a carboxylic acid or a strongly activated ester ; and the stereochemical configuration at positions 2 and 3 and of the carbon bearing R₁ (if R₁ is not H) can be any one of (S,S,S), (S,S,R), (S,R,S), (S,R,R), (R,S,S), (R,S,R), (R,R,S) or (R,R,R).

26. The compound of Claim 25, wherein R₅ is N₃.

25 27. The compound of Claim 25, wherein R₅ is NR₂Y.

28. The compound of Claim 25, wherein Z is OMe.

29. The compound of Claim 25, wherein X is benzylcarbamate.

30. The compound of Claim 25, wherein Y is 2-nitrobenzenesulfonamide.

31. The compound of Claim 25, wherein Y is 9-fluoroenylmethylcarbamate.

32. The compound of Claim 25, wherein X is benzylcarbamate, R₅ is NR₂Y, R₂ is H, Y is 9-fluoroenylmethylcarbamate, Z is -OMe, and R₆ is a carboxylic acid.

5 33. The compound of Claim 25, wherein R₁ is an alkene.

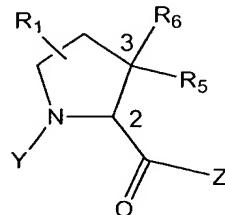
34. The compound of Claim 25, wherein R₁ is a protected carboxylate.

35. The compound of Claim 25, wherein R₁ is a protected alcohol.

36. The compound of Claim 25, wherein R₁ is a protected thiol.

37. A compound having the formula

10



(4)

where:

15 X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R₁ represents an H, or a functional group, and can be attached to the molecule at positions 2, 4 or 5;

R₂ represents an H or a functional group;

20 R₅ represents N₃ or NR₂X;

R₆ represents a carboxylic acid or a strongly activated ester ; and the stereochemical configuration at positions 2 and 3 and of the carbon bearing R₁ (if R₁ is not H) can be any one of (S,S,S), (S,S,R), (S,R,S), (S,R,R), (R,S,S), (R,S,R), (R,R,S) or (R,R,R).

25 38. The compound of Claim 37, wherein R₅ is N₃.

39. The compound of Claim 37, wherein R₅ is NR₂X.

40. The compound of Claim 37, wherein Z is OMe.

41. The compound of Claim 37, wherein X is benzylcarbamate.

42. The compound of Claim 37, wherein Y is 2-nitrobenzenesulfonamide.

43. The compound of Claim 37, wherein Y is 9-fluoroenylmethylcarbamate.

44. The compound of Claim 37, wherein X is benzylcarbamate, R₅ is NR₂X, R₂ is H, Y is 9-fluoroenylmethylcarbamate, Z is -OMe, and R₆ is a carboxylic acid.

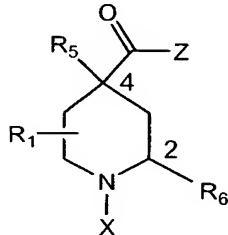
5 45. The compound of Claim 37, wherein R₁ is an alkene.

46. The compound of Claim 37, wherein R₁ is a protected carboxylate.

47. The compound of Claim 37, wherein R₁ is a protected alcohol.

48. The compound of Claim 37, wherein R₁ is a protected thiol.

10 49. A compound having the formula



(5)

where:

X represents a first amine protecting group;

15 Y represents a second amine protecting group;

Z represents a weak leaving group;

R₁ represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 5 or 6;

R₂ represents an H or a functional group;

20 R₅ represents N₃ or NR₂Y;

R₆ represents a carboxylic acid or a strongly activated ester ; and the stereochemical configuration at positions 2 and 4 and of the carbon bearing R₁ (if R₁ is not H) can be any one of (S,S,S), (S,S,R), (S,R,S), (S,R,R), (R,S,S), (R,S,R), (R,R,S) or (R,R,R).

25 50. The compound of Claim 49, wherein R₅ is N₃.

51. The compound of Claim 49, wherein R₅ is NR₂Y.

52. The compound of Claim 49, wherein Z is OMe.

53. The compound of Claim 49, wherein X is benzylcarbamate.

54. The compound of Claim 49, wherein Y is 2-nitrobenzenesulfonamide.

55. The compound of Claim 49, wherein Y is 9-fluoroenylmethylcarbamate.

56. The compound of Claim 49, wherein X is benzylcarbamate, R₅ is NR₂Y, R₂ is H, Y is 9-fluoroenylmethylcarbamate, Z is -OMe, and R₆ is a carboxylic acid.

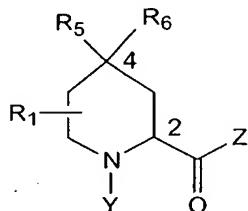
57. The compound of Claim 49, wherein R₁ is an alkene.

58. The compound of Claim 49, wherein R₁ is a protected carboxylate.

59. The compound of Claim 49, wherein R₁ is a protected alcohol.

60. The compound of Claim 49, wherein R₁ is a protected thiol.

10 61. A compound having the formula



(6)

where:

15 X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R₁ represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 5 or 6;

R₂ represents an H or a functional group;

20 R₅ represents N₃ or NR₂X;

R₆ represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at positions 2 and 4 and of the carbon bearing R₁ (if R₁ is not H) can be any one of (S,S,S), (S,S,R), (S,R,S), (S,R,R), (R,S,S), (R,S,R), (R,R,S) or (R,R,R).

25 62. The compound of Claim 61, wherein R₅ is N₃.

63. The compound of Claim 61, wherein R₅ is NR₂X.

64. The compound of Claim 61, wherein Z is OMe.

65. The compound of Claim 61, wherein X is benzylcarbamate.

66. The compound of Claim 61, wherein Y is 2-nitrobenzenesulfonamide.

67. The compound of Claim 61, wherein Y is 9-fluoroenylmethylcarbamate.

68. The compound of Claim 61, wherein X is benzylcarbamate, R₅ is NR₂X, R₂ is H, Y is 9-fluoroenylmethylcarbamate, Z is -OMe, and R₆ is a carboxylic acid.

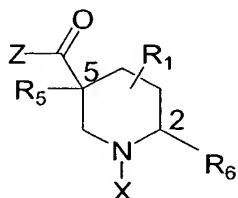
5
69. The compound of Claim 61, wherein R₁ is an alkene.

70. The compound of Claim 61, wherein R₁ is a protected carboxylate.

71. The compound of Claim 61, wherein R₁ is a protected alcohol.

72. The compound of Claim 61, wherein R₁ is a protected thiol.

10 73. A compound having the formula



(7)

where:

15 X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R₁ represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 4 or 6;

20 R₂ represents an H or a functional group;

R₅ represents N₃ or NR₂Y;

R₆ represents a carboxylic acid or a strongly activated ester ; and the stereochemical configuration at positions 2 and 5 and of the carbon bearing R₁ (if R₁ is not H) can be any one of (S,S,S), (S,S,R), (S,R,S), (S,R,R), (R,S,S), (R,S,R), (R,R,S) or (R,R,R).

25
74. The compound of Claim 73, wherein R₅ is N₃.

75. The compound of Claim 73, wherein R₅ is NR₂Y.

76. The compound of Claim 73, wherein Z is OMe.

77. The compound of Claim 73, wherein X is benzylcarbamate.

78. The compound of Claim 73, wherein Y is 2-nitrobenzenesulfonamide.

79. The compound of Claim 73, wherein Y is 9-fluoroenylmethylcarbamate.

80. The compound of Claim 73, wherein X is benzylcarbamate, R₅ is NR₂Y, R₂ is H,
5 Y is 9-fluoroenylmethylcarbamate, Z is -OMe, and R₆ is a carboxylic
acid.

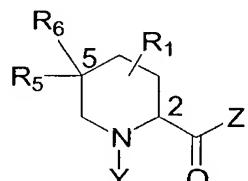
81. The compound of Claim 73, wherein R₁ is an alkene.

82. The compound of Claim 73, wherein R₁ is a protected carboxylate.

83. The compound of Claim 73, wherein R₁ is a protected alcohol.

84. The compound of Claim 73, wherein R₁ is a protected thiol.

10 85. A compound having the formula



(8)

where:

15 X represents a first amine protecting group;
Y represents a second amine protecting group;
Z represents a weak leaving group;
R₁ represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 5 or 6;

20 R₂ represents an H or a functional group;
R₅ represents N₃ or NR₂X;
R₆ represents a carboxylic acid or a strongly activated ester ; and
the stereochemical configuration at positions 2 and 5 and of the carbon bearing R₁
(if R₁ is not H) can be any one of (S,S,S), (S,S,R), (S,R,S), (S,R,R), (R,S,S),
25 (R,S,R), (R,R,S) or (R,R,R).

86. The compound of Claim 85, wherein R₅ is N₃.

87. The compound of Claim 85, wherein R₅ is NR₂X.

88. The compound of Claim 85, wherein Z is OMe.

89. The compound of Claim 85, wherein X is benzylcarbamate.

90. The compound of Claim 85, wherein Y is 2-nitrobenzenesulfonamide.

91. The compound of Claim 85, wherein Y is 9-fluoroenylmethylcarbamate.

92. The compound of Claim 85, wherein X is benzylcarbamate, R₅ is NR₂X, R₂ is H,
5 Y is 9-fluoroenylmethylcarbamate, Z is -OMe, and R₆ is a carboxylic acid.

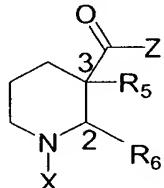
93. The compound of Claim 85, wherein R₁ is an alkene.

94. The compound of Claim 85, wherein R₁ is a protected carboxylate.

95. The compound of Claim 85, wherein R₁ is a protected alcohol.

96. The compound of Claim 85, wherein R₁ is a protected thiol.

10 97. A compound having the formula



(9)

where:

X represents a first amine protecting group;

15 Y represents a second amine protecting group;
Z represents a weak leaving group;
R₁ represents an H, or a functional group, and can be attached to the molecule at positions 2, 4, 5 or 6;
R₂ represents an H or a functional group;

20 R₅ represents N₃ or NR₂Y;
R₆ represents a carboxylic acid or a strongly activated ester ; and
the stereochemical configuration at positions 2 and 3 and of the carbon bearing R₁
(if R₁ is not H) can be any one of (S,S,S), (S,S,R), (S,R,S), (S,R,R), (R,S,S),
(R,S,R), (R,R,S) or (R,R,R).

25 98. The compound of Claim 97, wherein R₅ is N₃.
99. The compound of Claim 97, wherein R₅ is NR₂Y.
100. The compound of Claim 97, wherein Z is OMe.
101. The compound of Claim 97, wherein X is benzylcarbamate.
102. The compound of Claim 97, wherein Y is 2-nitrobenzenesulfonamide.

103. The compound of Claim 97, wherein Y is 9-fluoroenylmethylcarbamate.

104. The compound of Claim 97, wherein X is benzylcarbamate, R₅ is NR₂Y, R₂ is H, Y is 9-fluoroenylmethylcarbamate, Z is -OMe, and R₆ is a carboxylic acid.

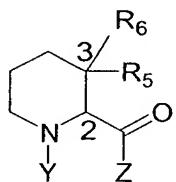
5 105. The compound of Claim 97, wherein R₁ is an alkene.

106. The compound of Claim 97, wherein R₁ is a protected carboxylate.

107. The compound of Claim 97, wherein R₁ is a protected alcohol.

108. The compound of Claim 97, wherein R₁ is a protected thiol.

109. A compound having the formula



10 (10)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

15 Z represents a weak leaving group;

R₁ represents an H, or a functional group, and can be attached to the molecule at positions 2, 4, 5 or 6;

R₂ represents an H or a functional group;

R₅ represents N₃ or NR₂X;

20 R₆ represents a carboxylic acid or a strongly activated ester ; and the stereochemical configuration at positions 2 and 3 and of the carbon bearing R₁ (if R₁ is not H) can be any one of (S,S,S), (S,S,R), (S,R,S), (S,R,R), (R,S,S), (R,S,R), (R,R,S) or (R,R,R).

110. The compound of Claim 109, wherein R₅ is N₃.

25 111. The compound of Claim 109, wherein R₅ is NR₂X.

112. The compound of Claim 109, wherein Z is OMe.

113. The compound of Claim 109, wherein X is benzylcarbamate.

114. The compound of Claim 109, wherein Y is 2-nitrobenzenesulfonamide.

115. The compound of Claim 109, wherein Y is 9-fluoroenylmethylcarbamate.

116. The compound of Claim 109, wherein X is benzylcarbamate, R₅ is NR₂X, R₂ is H, Y is 9-fluoroenylmethylcarbamate, Z is -OMe, and R₆ is a carboxylic acid.

117. The compound of Claim 109, wherein R₁ is an alkene.

5 118. The compound of Claim 109, wherein R₁ is a protected carboxylate.

119. The compound of Claim 109, wherein R₁ is a protected alcohol.

120. The compound of Claim 109, wherein R₁ is a protected thiol.

121. A compound having the formula

(11)

10 where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

15 R₁ represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 4, 5, 6, 8 or 9;

R₂ represents an H or a functional group;

R₅ represents N₃ or NR₂Y;

R₆ represents a carboxylic acid or a strongly activated ester ; and

20 the stereochemical configuration at positions 2, 4, 7, 9 and of the carbon bearing R₁ (if R₁ is not H) can be any of the 32 combinations of (R) and (S).

122. The compound of Claim 121, wherein R₅ is N₃.

123. The compound of Claim 121, wherein R₅ is NR₂Y.

124. The compound of Claim 121, wherein Z is OMe.

25 125. The compound of Claim 121, wherein X is benzylcarbamate.

126. The compound of Claim 121, wherein Y is 2-nitrobenzenesulfonamide.

127. The compound of Claim 121, wherein Y is 9-fluoroenylmethylcarbamate.

128. The compound of Claim 121, wherein X is benzylcarbamate, R₅ is NR₂Y, R₂ is H, Y is 9-fluoroenylmethylcarbamate, Z is -OMe, and R₆ is a carboxylic acid.

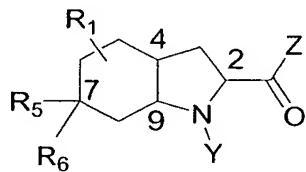
129. The compound of Claim 121, wherein R₁ is an alkene.

5 130. The compound of Claim 121, wherein R₁ is a protected carboxylate.

131. The compound of Claim 121, wherein R₁ is a protected alcohol.

132. The compound of Claim 121, wherein R₁ is a protected thiol.

133. A compound having the formula



10

(12)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

15 R₁ represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 4, 5, 6, 8 or 9;

R₂ represents an H or a functional group;

R₅ represents N₃ or NR₂X;

R₆ represents a carboxylic acid or a strongly activated ester ; and

20 the stereochemical configuration at positions 2, 4, 7, 9 and of the carbon bearing R₁ (if R₁ is not H) can be any of the 32 combinations of (R) and (S).

134. The compound of Claim 133, wherein R₅ is N₃.

135. The compound of Claim 133, wherein R₅ is NR₂X.

136. The compound of Claim 133, wherein Z is OMe.

25 137. The compound of Claim 133, wherein X is benzylcarbamate.

138. The compound of Claim 133, wherein Y is 2-nitrobenzenesulfonamide.

139. The compound of Claim 133, wherein Y is 9-fluoroenylmethylcarbamate.

140. The compound of Claim 133, wherein X is benzylcarbamate, R₅ is NR₂X, R₂ is H, Y is 9-fluoroenylmethylcarbamate, Z is -OMe, and R₆ is a carboxylic acid.

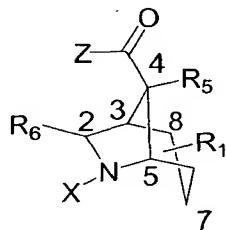
141. The compound of Claim 133, wherein R₁ is an alkene.

5 142. The compound of Claim 133, wherein R₁ is a protected carboxylate.

143. The compound of Claim 133, wherein R₁ is a protected alcohol.

144. The compound of Claim 133, wherein R₁ is a protected thiol.

145. A compound having the formula



10

(13)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

15 R₁ represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 5, 6, 7 or 8;

R₂ represents an H or a functional group;

R₅ represents N₃ or NR₂Y;

R₆ represents a carboxylic acid or a strongly activated ester ; and

20 the stereochemical configuration at the positions 2, 3, 4 and 5, and of the carbon bearing R₁ (if R₁ is not H) can be any of the 32 combinations of (R) and (S).

146. The compound of Claim 145, wherein R₅ is N₃.

147. The compound of Claim 145, wherein R₅ is NR₂Y.

148. The compound of Claim 145, wherein Z is OMe.

25 149. The compound of Claim 145, wherein X is benzylcarbamate.

150. The compound of Claim 145, wherein Y is 2-nitrobenzenesulfonamide.

151. The compound of Claim 145, wherein Y is 9-fluoroenylmethylcarbamate.

152. The compound of Claim 145, wherein X is benzylcarbamate, R₅ is NR₂Y, R₂ is H, Y is 9-fluoroenylmethylcarbamate, Z is -OMe, and R₆ is a carboxylic acid.

153. The compound of Claim 145, wherein R₁ is an alkene.

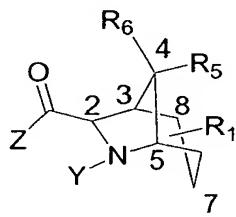
5 154. The compound of Claim 145, wherein R₁ is a protected carboxylate.

155. The compound of Claim 145, wherein R₁ is a protected alcohol.

156. The compound of Claim 145, wherein R₁ is a protected thiol.

157. A compound having the formula

10



(14)

where:

15 X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R₁ represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 5, 6, 7 or 8;

R₂ represents an H or a functional group;

R₅ represents N₃ or NR₂X;

20 R₆ represents a carboxylic acid or a strongly activated ester ; and the stereochemical configuration at the positions 2, 3, 4 and 5, and of the carbon bearing R₁ (if R₁ is not H) can be any of the 32 combinations of (R) and (S).

158. The compound of Claim 157, wherein R₅ is N₃.

159. The compound of Claim 157, wherein R₅ is NR₂X.

25 160. The compound of Claim 157, wherein Z is OMe.

161. The compound of Claim 157, wherein X is benzylcarbamate.

162. The compound of Claim 157, wherein Y is 2-nitrobenzenesulfonamide.

163. The compound of Claim 157, wherein Y is 9-fluoroenylmethylcarbamate.

164. The compound of Claim 157, wherein X is benzylcarbamate, R₅ is NR₂X, R₂ is H, Y is 9-fluoroenylmethylcarbamate, Z is -OMe, and R₆ is a carboxylic acid.

165. The compound of Claim 157, wherein R₁ is an alkene.

5 166. The compound of Claim 157, wherein R₁ is a protected carboxylate.

167. The compound of Claim 157, wherein R₁ is a protected alcohol.

168. The compound of Claim 157, wherein R₁ is a protected thiol.

169. A method of synthesizing *bis* peptides comprising the steps of:

10 1) providing a solid support;

2) activating a first *bis* amino acid or naturally occurring amino acid;

15 3) attaching the *bis* amino acid or naturally occurring amino acid to the support;

4) removing the leading edge amine protecting group if a *bis* amino acid is used, or the amine protecting group if a naturally occurring amino acid is used;

15 5) activating and attaching a next *bis* amino acid or a next naturally occurring amino acid to the leading edge amine of the *bis* amino acid or amine of the naturally occurring amino acid; and

6) repeating steps 4 and 5 as necessary to achieve the desired chain length;

7) detaching the synthesized *bis* peptide from the support; and

20 8) isolating the synthesized *bis* peptide,

where the *bis* peptide synthesized in the above manner has at least two contiguous *bis* amino acids, and a rigidification step is carried out either after step 4 or after detachment of the *bis* peptide from the solid support.

170. The method of Claim 169, further comprising the step of modifying or adding a 25 functional group, after step 5.

171. A method of synthesizing *bis* peptides comprising the steps of:

1) providing a *bis*-amino acid or *bis*-peptide fragment containing a mixture of *bis*-amino acid and naturally occurring amino acid with an unprotected leading edge amine and a protected trailing edge carboxylic acid;

30 2) providing a *bis*-s or *bis*-peptide fragment containing a mixture of *bis*-amino acid and naturally occurring amino acids with a protected leading edge amine and an activated ester;

3) coupling the two fragments in solution;

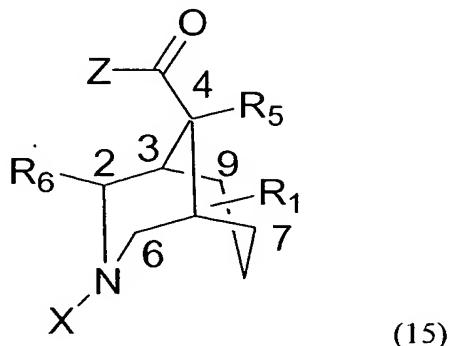
4) isolating the synthesized *bis*-peptide;

5) removing the leading edge amine protecting group or the trailing end carboxylic acid protecting group; and

5) repeating steps 1,2,3,4 to achieve the desired chain length;
 where the *bis* peptide synthesized in the above manner has at least two contiguous *bis* amino acids, and a rigidification step is carried out either after step 3 or after detachment of the *bis* peptide from the solid support.

172. The method of Claim 171, further comprising the step of modifying or adding 10 a functional group, after step 3.

173. A compound having the formula



where:

15 X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R₁ represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 5, 6, 7, 8 or 9;

20 R₂ represents an H or a functional group;

R₅ represents N₃ or NR₂Y;

R₆ represents a carboxylic acid or a strongly activated ester ; and
 the stereochemical configuration at the positions 2, 3, 4 and 5, and of the carbon bearing R₁ (if R₁ is not H) can be any of the 32 combinations of (R) and (S).

25 174. The compound of Claim 173, wherein R₅ is N₃.

175. The compound of Claim 173, wherein R₅ is NR₂Y.

176. The compound of Claim 173, wherein Z is OMe.

177. The compound of Claim 173, wherein X is benzylcarbamate.

178. The compound of Claim 173, wherein Y is 2-nitrobenzenesulfonamide.

179. The compound of Claim 173, wherein Y is 9-fluoroenylmethylcarbamate.

5 180. The compound of Claim 173, wherein X is benzylcarbamate, R₅ is NR₂Y, R₂ is H, Y is 9-fluoroenylmethylcarbamate, Z is -OMe, and R₆ is a carboxylic acid.

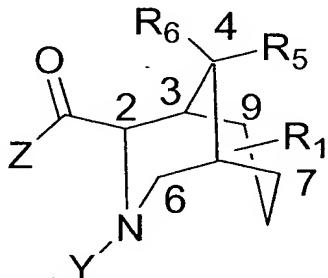
181. The compound of Claim 173, wherein R₁ is an alkene.

182. The compound of Claim 173, wherein R₁ is a protected carboxylate.

10 183. The compound of Claim 173, wherein R₁ is a protected alcohol.

184. The compound of Claim 173, wherein R₁ is a protected thiol.

185. A compound having the formula



(16)

15 where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

20 R₁ represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 5, 6, 7, 8 or 9;

R₂ represents an H or a functional group;

R₅ represents N₃ or NR₂X;

R₆ represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at the positions 2, 3, 4 and 5, and of the carbon bearing R₁ (if R₁ is not H) can be any of the 32 combinations of (R) and (S).

25 186. The compound of Claim 185, wherein R₅ is N₃.

187. The compound of Claim 185, wherein R₅ is NR₂X.

188. The compound of Claim 185, wherein Z is OMe.

189. The compound of Claim 185, wherein X is benzylcarbamate.

190. The compound of Claim 185, wherein Y is 2-nitrobenzenesulfonamide.

191. The compound of Claim 185, wherein Y is 9-fluoroenylmethylcarbamate.

5 192. The compound of Claim 185, wherein X is benzylcarbamate, R₅ is NR₂X, R₂ is H, Y is 9-fluoroenylmethylcarbamate, Z is -OMe, and R₆ is a carboxylic acid.

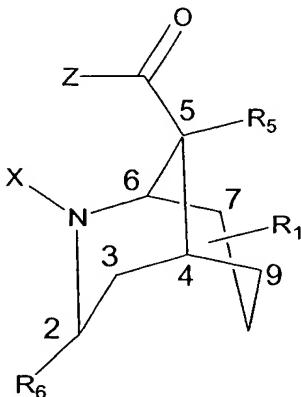
193. The compound of Claim 185, wherein R₁ is an alkene.

194. The compound of Claim 185, wherein R₁ is a protected carboxylate.

10 195. The compound of Claim 185, wherein R₁ is a protected alcohol.

196. The compound of Claim 185, wherein R₁ is a protected thiol.

197. A compound having the formula



(17)

15 where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

20 R₁ represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 4, 6, 7, 8 or 9;

R₂ represents an H or a functional group;

R₅ represents N₃ or NR₂Y;

R₆ represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at the positions 2, 4, 5 and 6, and of the carbon bearing R₁ (if R₁ is not H) can be any of the 32 combinations of (R) and (S).

198. The compound of Claim 197, wherein R_5 is N_3 .

199. The compound of Claim 197, wherein R_5 is NR_2Y .

200. The compound of Claim 197, wherein Z is OMe .

201. The compound of Claim 197, wherein X is benzylcarbamate.

5 202. The compound of Claim 197, wherein Y is 2-nitrobenzenesulfonamide.

203. The compound of Claim 197, wherein Y is 9-fluoroenylmethylcarbamate.

204. The compound of Claim 197, wherein X is benzylcarbamate, R_5 is NR_2Y , R_2 is H , Y is 9-fluoroenylmethylcarbamate, Z is $-OMe$, and R_6 is a carboxylic acid.

10 205. The compound of Claim 197, wherein R_1 is an alkene.

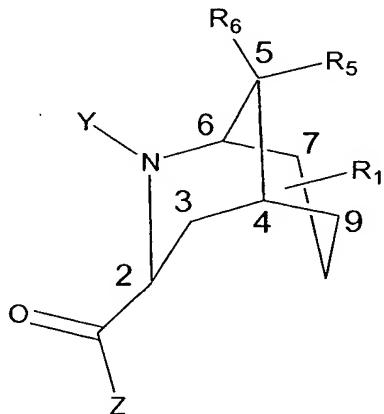
206. The compound of Claim 197, wherein R_1 is a protected carboxylate.

207. The compound of Claim 197, wherein R_1 is a protected alcohol.

208. The compound of Claim 197, wherein R_1 is a protected thiol.

15

209. A compound having the formula



(18)

where:

20 X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R_1 represents an H , or a functional group, and can be attached to the molecule at positions 2, 3, 4, 6, 7, 8 or 9;

25 R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2X ;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at the positions 2, 4, 5 and 6, and of the carbon bearing R_1 (if R_1 is not H) can be any of the 32 combinations of (R) and (S).

5 210. The compound of Claim 209, wherein R_5 is N_3 .

211. The compound of Claim 209, wherein R_5 is NR_2X .

212. The compound of Claim 209, wherein Z is OMe .

213. The compound of Claim 209, wherein X is benzylcarbamate.

214. The compound of Claim 209, wherein Y is 2-nitrobenzenesulfonamide.

10 215. The compound of Claim 209, wherein Y is 9-fluoroenylmethylcarbamate.

216. The compound of Claim 209, wherein X is benzylcarbamate, R_5 is NR_2X , R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is $-OMe$, and R_6 is a carboxylic acid.

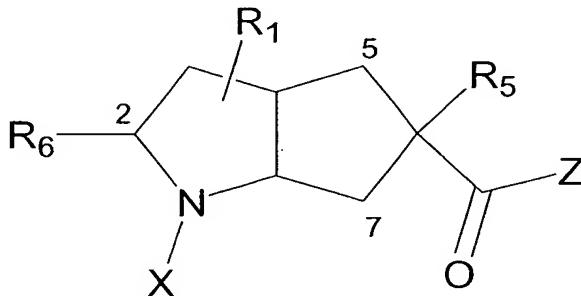
217. The compound of Claim 209, wherein R_1 is an alkene.

15 218. The compound of Claim 209, wherein R_1 is a protected carboxylate.

219. The compound of Claim 209, wherein R_1 is a protected alcohol.

220. The compound of Claim 209, wherein R_1 is a protected thiol.

221. A compound having the formula



20

(19)

where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

25 R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 4, 5, 7 or 8;

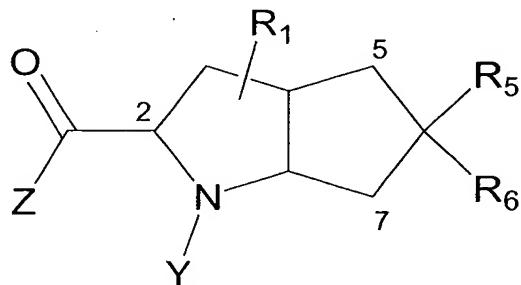
R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2Y ;

R_6 represents a carboxylic acid or a strongly activated ester ; and

the stereochemical configuration at the positions 2, 4, 6 and 8, and of the carbon bearing R_1 (if R_1 is not H) can be any of the 32 combinations of (R) and (S).

5 222. The compound of Claim 221, wherein R_5 is N_3 .
223. The compound of Claim 221, wherein R_5 is NR_2Y .
224. The compound of Claim 221, wherein Z is OMe .
225. The compound of Claim 221, wherein X is benzylcarbamate.
226. The compound of Claim 221, wherein Y is 2-nitrobenzenesulfonamide.
10 227. The compound of Claim 221, wherein Y is 9-fluoroenylmethylcarbamate.
228. The compound of Claim 221, wherein X is benzylcarbamate, R_5 is NR_2Y , R_2 is H, Y is 9-fluoroenylmethylcarbamate, Z is $-OMe$, and R_6 is a carboxylic acid.
229. The compound of Claim 221, wherein R_1 is an alkene.
15 230. The compound of Claim 221, wherein R_1 is a protected carboxylate.
231. The compound of Claim 221, wherein R_1 is a protected alcohol.
232. The compound of Claim 221, wherein R_1 is a protected thiol.
233. A compound having the formula



20

(20)

where:

X represents a first amine protecting group;

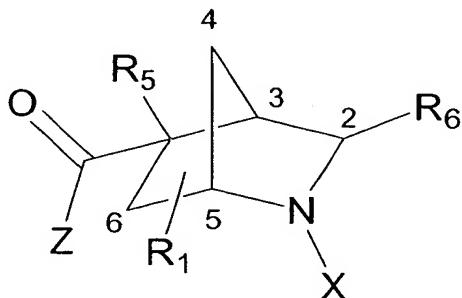
Y represents a second amine protecting group;

25 Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 4, 5, 7 or 8;

R₂ represents an H or a functional group;
R₅ represents N₃ or NR₂X;
R₆ represents a carboxylic acid or a strongly activated ester ; and
the stereochemical configuration at the positions 2, 4, 6 and 8, and of the carbon
bearing R₁ (if R₁ is not H) can be any of the 32 combinations of (R) and (S).

5 234. The compound of Claim 233, wherein R₅ is N₃.
235. The compound of Claim 233, wherein R₅ is NR₂X.
236. The compound of Claim 233, wherein Z is OMe.
237. The compound of Claim 233, wherein X is benzylcarbamate.
10 238. The compound of Claim 233, wherein Y is 2-nitrobenzenesulfonamide.
239. The compound of Claim 233, wherein Y is 9-fluoroenylmethylcarbamate.
240. The compound of Claim 233, wherein X is benzylcarbamate, R₅ is NR₂X, R₂ is
H, Y is 9-fluoroenylmethylcarbamate, Z is -OMe, and R₆ is a carboxylic
acid.
15 241. The compound of Claim 233, wherein R₁ is an alkene.
242. The compound of Claim 233, wherein R₁ is a protected carboxylate.
243. The compound of Claim 233, wherein R₁ is a protected alcohol.
244. The compound of Claim 233, wherein R₁ is a protected thiol.
245. A compound having the formula



20

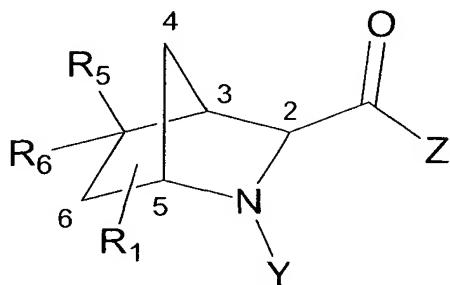
(21)

where:

X represents a first amine protecting group;
Y represents a second amine protecting group;
25 Z represents a weak leaving group;
R₁ represents an H, or a functional group, and can be attached to the molecule at
positions 2, 3, 4, 5 or 6;

R_2 represents an H or a functional group;
 R_5 represents N_3 or NR_2Y ;
 R_6 represents a carboxylic acid or a strongly activated ester ; and
 the stereochemical configuration at the positions 2, 3, 5 and 7, and of the carbon
 bearing R_1 (if R_1 is not H) can be any of the 32 combinations of (R) and (S).

5 246. The compound of Claim 245, wherein R_5 is N_3 .
 247. The compound of Claim 245, wherein R_5 is NR_2Y .
 248. The compound of Claim 245, wherein Z is OMe .
 249. The compound of Claim 245, wherein X is benzylcarbamate.
 10 250. The compound of Claim 245, wherein Y is 2-nitrobenzenesulfonamide.
 251. The compound of Claim 245, wherein Y is 9-fluoroenylmethylcarbamate.
 252. The compound of Claim 245, wherein X is benzylcarbamate, R_5 is NR_2Y , R_2 is
 H, Y is 9-fluoroenylmethylcarbamate, Z is $-OMe$, and R_6 is a carboxylic
 acid.
 15 253. The compound of Claim 245, wherein R_1 is an alkene.
 254. The compound of Claim 245, wherein R_1 is a protected carboxylate.
 255. The compound of Claim 245, wherein R_1 is a protected alcohol.
 256. The compound of Claim 245, wherein R_1 is a protected thiol.
 20 257. A compound having the formula



(22)

where:

X represents a first amine protecting group;
 25 Y represents a second amine protecting group;
 Z represents a weak leaving group;

R_1 represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 4, 5 or 6;

R_2 represents an H or a functional group;

R_5 represents N_3 or NR_2X ;

5 R_6 represents a carboxylic acid or a strongly activated ester ; and the stereochemical configuration at the positions 2, 3, 5 and 7, and of the carbon bearing R_1 (if R_1 is not H) can be any of the 32 combinations of (R) and (S).

258. The compound of Claim 257, wherein R_5 is N_3 .

259. The compound of Claim 257, wherein R_5 is NR_2X .

10 260. The compound of Claim 257, wherein Z is OMe.

261. The compound of Claim 257, wherein X is benzylcarbamate.

262. The compound of Claim 257, wherein Y is 2-nitrobenzenesulfonamide.

263. The compound of Claim 257, wherein Y is 9-fluoroenylmethylcarbamate.

264. The compound of Claim 257, wherein X is benzylcarbamate, R_5 is NR_2X , R_2 is

15 H, Y is 9-fluoroenylmethylcarbamate, Z is -OMe, and R_6 is a carboxylic acid.

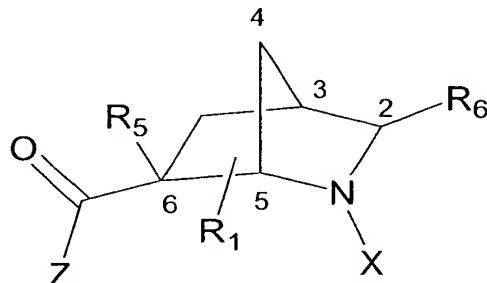
265. The compound of Claim 257, wherein R_1 is an alkene.

266. The compound of Claim 257, wherein R_1 is a protected carboxylate.

267. The compound of Claim 257, wherein R_1 is a protected alcohol.

20 268. The compound of Claim 257, wherein R_1 is a protected thiol.

269. A compound having the formula



(23)

25 where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R₁ represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 4, 5 or 7;

R₂ represents an H or a functional group;

5 R₅ represents N₃ or NR₂Y;

R₆ represents a carboxylic acid or a strongly activated ester ; and the stereochemical configuration at the positions 2, 3, 5 and 6, and of the carbon bearing R₁ (if R₁ is not H) can be any of the 32 combinations of (R) and (S).

270. The compound of Claim 269, wherein R₅ is N₃.

10 271. The compound of Claim 269, wherein R₅ is NR₂Y.

272. The compound of Claim 269, wherein Z is OMe.

273. The compound of Claim 269, wherein X is benzylcarbamate.

274. The compound of Claim 269, wherein Y is 2-nitrobenzenesulfonamide.

275. The compound of Claim 269, wherein Y is 9-fluoroenylmethylcarbamate.

15 276. The compound of Claim 269, wherein X is benzylcarbamate, R₅ is NR₂Y, R₂ is H, Y is 9-fluoroenylmethylcarbamate, Z is -OMe, and R₆ is a carboxylic acid.

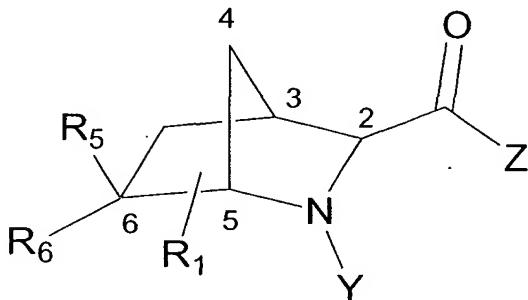
277. The compound of Claim 269, wherein R₁ is an alkene.

278. The compound of Claim 269, wherein R₁ is a protected carboxylate.

279. The compound of Claim 269, wherein R₁ is a protected alcohol.

20 280. The compound of Claim 269, wherein R₁ is a protected thiol.

281. A compound having the formula



(24)

25 where:

X represents a first amine protecting group;

Y represents a second amine protecting group;

Z represents a weak leaving group;

R₁ represents an H, or a functional group, and can be attached to the molecule at positions 2, 3, 4, 5 or 7;

5 R₂ represents an H or a functional group;

R₅ represents N₃ or NR₂X;

R₆ represents a carboxylic acid or a strongly activated ester ; and the stereochemical configuration at the positions 2, 3, 5 and 6, and of the carbon bearing R₁ (if R₁ is not H) can be any of the 32 combinations of (R) and (S).

10 282. The compound of Claim 281, wherein R₅ is N₃.

283. The compound of Claim 281, wherein R₅ is NR₂X.

284. The compound of Claim 281, wherein Z is OMe.

285. The compound of Claim 281, wherein X is benzylcarbamate.

286. The compound of Claim 281, wherein Y is 2-nitrobenzenesulfonamide.

15 287. The compound of Claim 281, wherein Y is 9-fluoroenylmethylcarbamate.

288. The compound of Claim 281, wherein X is benzylcarbamate, R₅ is NR₂X, R₂ is H, Y is 9-fluoroenylmethylcarbamate, Z is -OMe, and R₆ is a carboxylic acid.

289. The compound of Claim 281, wherein R₁ is an alkene.

20 290. The compound of Claim 281, wherein R₁ is a protected carboxylate.

291. The compound of Claim 281, wherein R₁ is a protected alcohol.

292. The compound of Claim 281, wherein R₁ is a protected thiol.

293. A synthesized *bis* peptide made by the method of Claim 169, where the number of amino acids in the peptide, whether naturally occurring or *bis* amino acids, 25 is less than 500.

294. A synthesized *bis* peptide made by the method of Claim 171, where the number of amino acids in the peptide, whether naturally occurring or *bis* amino acids, is less than 500.